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# MATERIALS TECHNOLOGY COMPANY

VITAL MATERIALS CO. , LIMITED

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**Empower the World with Photonics for a Better Life**

**Respect Collaboration Dedication Innovation**



## COMPANY PROFILE

Founded in 1995, Vital Materials is a high-tech enterprise and a global leader in R & D, production, sales, and recycling of rare metals and high-tech materials, devices, modules, and systems. It has established the China National Rare Metals Engineering Research Center, China National Enterprise Technology Center, Post-Doctoral R & D Center, and Vital Technology Group Central Research Institute.



### Core Competence

Vital Materials is the world's leading producer of rare metals as well as the first Chinese manufacturer to deliver G11 rotary ITO targets. Vital is also one of the world's leading suppliers of infrared materials, a key supplier of compound semiconductor substrates, and a strategic partner of the global PV enterprise, continuing to provide industry-leading integrated solutions to global customers.



Global Networks: 54



Countries: 20



Employees: 15,000+

Vital Materials implements a unique vertical integration strategy. We are dedicated to developing advanced materials and technologies for fast growing, high-tech companies in the semiconductors, microelectronics, artificial intelligence, 5G, optical communications, low-altitude economy, quantum technology, new energy, new-type displays, healthcare, automotive electronics, aerospace, consumer electronics, precision optics, and other industries.

Vital Materials' first class technical R&D platform continuously expands our portfolio of products and recycling services as a valued solution provider for our customers. Our ongoing development of clean technologies reflects our position as a leader in environmental responsibility. Both of these initiatives enable us to grow and evolve sustainably as a responsible materials technology firm.

# COMPANY HISTORY

- The Beginning of Vital Materials
- Established Vital Materials Co., Ltd.
- Established High-tech Material Base



2011-2017

- Established Yunlong Industrial Park (Comprehensive Processing of Rare Metals)
- Established Vital Advanced Materials Co., Ltd.
- Acquisition of Environmental Pigment Business From Cappelle Pigments (Tianjin) Ltd.
- JV With Umicore to Build ITO Plant in Qingyuan
- Bought Out Umicore's Share in ITO Plant



1995-2010

- Established CS Microelectronic Co., Ltd.
- Acquisition of Magnetic Storage Business from Heraeus Singapore Facilities
- Acquisition of Comprehensive Recycling Business of Rare Metals from Hunan Chengyuan Non-ferrous Metal Co., Ltd.
- Acquisition of Bismuth Chemical Production Business from Orrion Chemicals Bischem, S. L.
- Acquisition of MO Sources Business From Lanxess

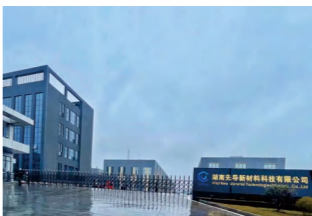


2018-2019



2020-2021

- Acquisition of Vacuum Coating Equipment Business From FHR Anlagenbau GmbH
- Acquisition of Ceramic Target Business From Samsung Corning Advanced Glass, LLC.
- Acquisition of Processing and Recycling Business of Various Complex Materials From PPM Pure Metals GmbH
- Established Dongguan Vital-Pioneer Technology Co., Ltd.
- Established Jiangsu Vital Micro-electronics Technology Co., Ltd.



2022-2023

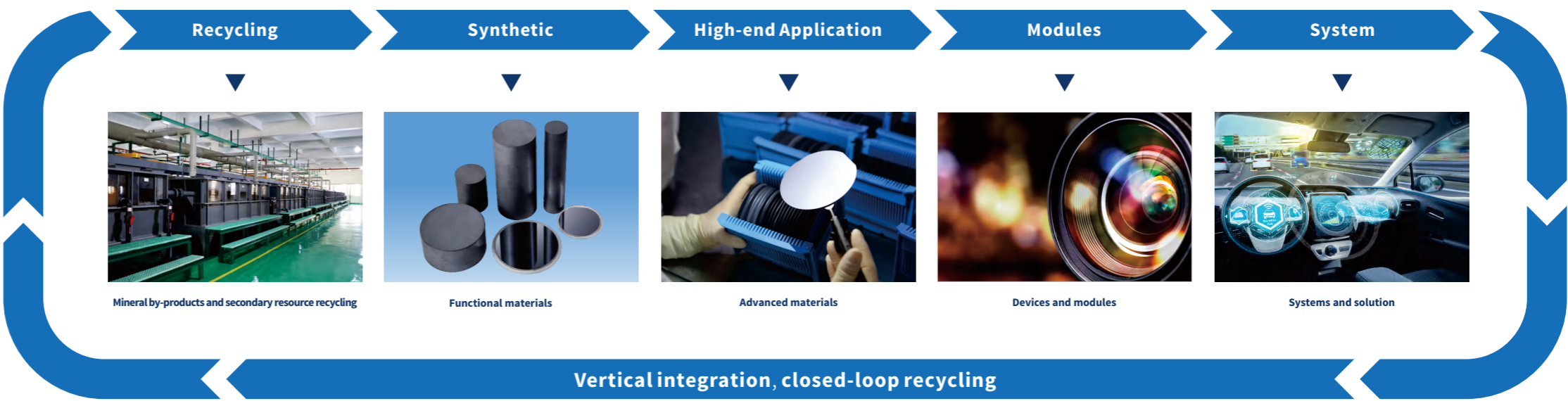
- Series A and B Founding Rounds Completed by Vital Thin Film Materials Co., Ltd.
- Hunan Vital New Material Technology Co., Ltd. Officially Being in Production
- Acquisition of Recycling and Refinery Business From 5N PLUS INC.
- Establishment of Vital & FHR North America, LLC.
- Acquisition of Jiangsu Yangzi Catalyst Co., Ltd.
- Acquisition of AllTech Medical Systems, LLC.
- Established Vital New Energy Technology (Zhuhai) Co., Ltd.
- Established Vital Sofine Semiconductor Co., Ltd.
- Vital Micro-electronics Technology Co., Ltd. Officially Being in Production



2024-2025

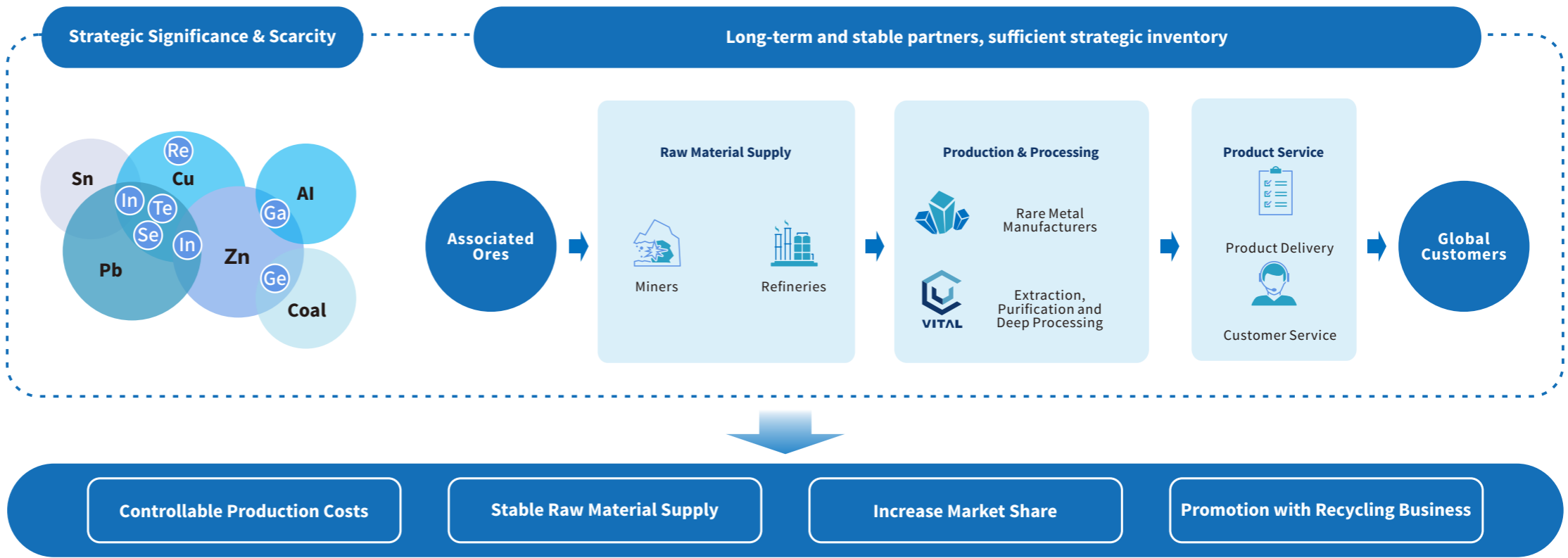
- Vital Micro-electronics Technology (Zhejiang) Co., Ltd. Officially Being in Production
- Established Vital Ultrasound (Chengdu) Technology Co., Ltd.
- Established Hainan Vital Optoelectronic Technology Co., Ltd.
- Being the holding company of Wanye Enterprises Co., Ltd. (Now renamed as Vital Deeptech)
- Established Anhui Vital PoleStar Xtreme Hemt Technology Co., Ltd.
- Vital (Hubei) New Materials Technologies Co., Ltd. Officially Being in Production
- Vital Intelligent Electronic Technology (Shandong) Co., Ltd. Officially Being in Production

# INDUSTRIAL CHAIN



# SUPPLY CHAIN

- Vital Materials possesses a unique global "Mobile Mine" of rare metals.
- With material advantages and global presence, Vital Materials has built a stable industrial chain system, maintaining long-term cooperative relationships with almost all miners, refineries and rare metal producers.



# COMPANY VISION



To Be a Global Leader in  
Photonics Innovation

# COMPANY STRATEGY

- Global Presence
- Vertical Integration
- Specialize in Rare Metals, Providing Comprehensive Solutions
- Be the Preferred Recycling Partner
- Focus on High-Tech Industries Including Semiconductor, Healthcare, Scientific Instruments, PV, LED, Infrared, Laser, 5G, Optical Communication, Display, Microelectronics, and Much More

# CERTIFICATES



# ELECTRONIC TECHNOLOGY BUSINESS UNIT

Electronic Technology Business Unit devotes to R&D, producing, sales, and recycling of sputtering targets and evaporation materials for physical vapor deposition (PVD), as well as vacuum coating equipment. Depending on the materials, a wide variety of products in different forms and shapes are available. Our materials products include high-purity metals, alloys, precious metals, and ceramic materials, are widely used in the new-type displays, photovoltaics, semiconductors, automotive electronics, precision optics, data storage, glass, and other industries. We also have R & D and manufacturing bases in China, South Korea, the United States, Germany, and Singapore.

## Product & Application Sputter Targets

Sputter Targets are mainly used in Vacuum Coating Equipment to coat thin films by Physical Vapor Deposition (PVD) on a substrate to add new functions or create micro-electronic connections and functions as Thin Film Transistors (TFT).

We manufacture planar and rotary Sputter Targets in a wide range of materials using all available and most advanced technologies to guarantee the best performance.

### Ceramic Targets

Al <sub>2</sub> O <sub>3</sub>	AZO	CdS	CdSe	IGZO
In <sub>2</sub> S <sub>3</sub>	In <sub>2</sub> Se <sub>3</sub>	ITO	Ln-IZO	NbOx
SnO <sub>2</sub>	TiOX	VTTO		

### Metal Targets

Ag	Al	Au	Cr	Cu	Ge
In	Mo	Nb	Ni	Pt	Ru
Si	Sn	Ta	Ti	V	AlSc
BeCu	CdTe	CdZnTe	C-GST	CIG	CIGS
CoTaZr	CrCo	CuGa	CuAl	CuMn	GeSbTe
InSn	NiPt	SiAl	WTi	ZnTe	ZrY

## Evaporation Materials

We provide a wide range of high-quality evaporation materials offering the best solution for any individual application. High-purity, optimized melting properties as well as low spitting during pre-melt and processing allows coating complex layer stacks with low defects and high yield.

Our products range includes precious metals, high-purity metals, metal alloys, fluorides, oxides and sulphides in a wide variety of shapes and geometries of granules, tablets, shots or disks.



## Vacuum Coating Equipment

We are committed to the research and development of thin film technology, vacuum-process equipment, sputtering-target manufacturing and related services including job coating and layer stack development. Its primary business is design and assembly of thin film deposition equipment that is widely used by internationally renowned customers e.g. for thin film solar cells, displays, in automotive, MEMS, optics, BAW/SAW, and decoration.

We are your trusted partner for technical support, technical training, preventive maintenance, spare/wear parts, qualification, technical audits e.g. to judge on the condition of your existing systems. We'll serve you for machine relocation, upgrades and modernizations (retrofits) even for third-party systems in the long term and most importantly, on a global scale.

FHR. Star-series

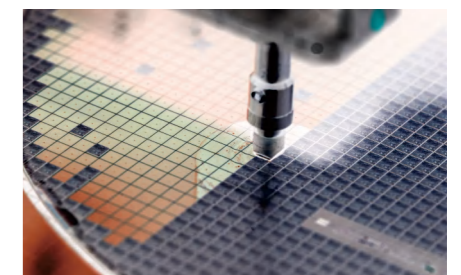
FHR. Boxx-series

FHR. Line-series

FHR. Roll-series

## Customer Service

We provide you with pre-sales and after-sales process debugging and technical support, metal whole industry chain closed-loop service, target material utilization solutions, solar cell conversion efficiency improvement solutions, and professional vacuum chamber components cleaning and scrap recycling services.



# OPTO-ELECTRONICS TECHNOLOGY BUSINESS UNIT

Opto-electronics Technology Business Unit is dedicated to the R&D, production, and sales of infrared materials, lenses, detectors, modules for infrared thermal imagers, infrared systems, laser devices and systems, and high-performance aluminum alloy materials. With our comprehensive capabilities spanning "material growth, chip design, device fabrication, and system integration," We deliver high-quality optoelectronic products and solutions. Our products are widely used in medical health, aerospace, low-altitude economy, automotive electronics, energy and metallurgy, new energy, public welfare, security and prevention, industrial manufacturing, intelligent buildings, and other industries.



## Product & Application

### Infrared Materials

As China's leading supplier of infrared materials, we are one of the few global suppliers capable of producing and supplying zinc selenide (ZnSe) materials in bulk. Our Ultra-high purity germanium can reach a purity of 13N.

Ge	ZnSe	ZnS	Chalcogenide glass		
GaAs	GaSb	InSb	Si	MgF <sub>2</sub>	CaF <sub>2</sub>

### Infrared Lenses

With over 200 innovative infrared lens designs and developments, we offer a comprehensive range of optical lenses for the infrared field, and customized R&D production services.

Athermalized Lens Assemblies	Electric Focus Lens Assemblies
Manual Focus Lens Assemblies	Continuous Zoom Lens Assemblies
* Full range Optional focal length	

### Infrared Detectors

We supply a diverse range of cooled and uncooled infrared detectors. With our established 8-inch silicon-based MEMS infrared detector chip production line and mid-wave MCT, InSb, and long-wave T2SL infrared cooled detector chip production line, we have the expertise in MEMS chip design and manufacturing processes, as well as metal, ceramic, and wafer-level packaging technologies.

### Thermal Modules

We offer a wide range of compact, high-sensitivity, ultra-low power consumption infrared thermal modules with various interfaces, including mainstream resolutions such as 320x256, 384x288, and 640x512. We also provide a variety of thermal modules specifically designed for robot, drone industries.

### Thermal Infrared Systems

We provide comprehensive solutions for end-users, integrating infrared thermal imaging components, control systems, display systems, storage systems, and pan-tilt systems. Our solutions cover OEM, ODM, and complete system delivery. We have developed a range of products for various industries, including outdoor applications, security, industrial temperature measurement, airborne pods, and gas detection.

### Laser Optical Components & Systems

We focus on R&D and production of various laser optical components, as well as laser modules and systems, which include various types of semiconductor lasers, solid-state lasers and fiber lasers, such as miniaturized laser modules, fiber-coupled lasers, pulsed lasers, picosecond lasers, femtosecond lasers, etc. Our products are applied in metal material processing, hard and brittle material processing such as diamond and silicon carbide, and laser medicine.

### Aluminum Alloy Materials

We have a diverse range of aluminum alloy materials with customization options. Our high-performance aluminum alloys are supplied to multiple heavy truck and leading transmission manufacturers. We have successfully developed alloy tubes for shock absorbers in new energy vehicles and have also added a new titanium-backed tube production line.



# SEMICONDUCTOR TECHNOLOGY BUSINESS UNIT

Semiconductor Technology Business Unit focuses on the research, development, production, and sales of III-V compound semiconductor materials, epitaxial wafers, chips, modules, and semiconductor components. Our products are widely used in various fields, including LED, Mini/Micro LED, 3D sensing, facial recognition, autonomous driving, AR/VR, 5G, optical communication, photovoltaics, quantum information technology, aerospace, semiconductor manufacturing.

## Product & Application

### High Purity Materials

High-purity materials have the characteristics of high purity, excellent performance, and wide applications, and are of significant importance in the fields of electronics, semiconductors, photovoltaics, chemistry, medicine, aerospace, etc. These high-purity materials can be used in advanced technologies such as crystal growth, Chemical Vapor Deposition (CVD) processes, Physical Vapor Deposition (PVD) processes, and Molecular Beam Epitaxy (MBE) technology, etc.

High Purity Metals					
Sb	As	Ga	Cu	In	P
Se	Te	Zn	Al	B	Be
Bi	Cd	Ge	Pb	S	Sn

MBE Sources					
Al	B	Be	Sb	As	Ga
In	P	S	Te	Sn	Zn

MO Sources		
TMA	TMG	TEG
TMI	CP <sub>2</sub> Mg	GaCl <sub>3</sub>

Electronic gases			
AsH <sub>3</sub>	Ph <sub>3</sub>	GeH <sub>4</sub>	H <sub>2</sub> Se
B <sub>2</sub> H <sub>6</sub>	SiH <sub>4</sub>	Nf <sub>3</sub>	Bcl <sub>3</sub>

(PBN)	
High-purity (>99.995%) ceramic crucible	

Precursors		
MoO <sub>2</sub> Cl <sub>2</sub>	HfCl <sub>4</sub>	BDEAS
TEMAH	TEMAZ	TEOS

### Substrates And EPI

VITAL utilizes advanced high-precision wire cutting equipment and high-flatness grinding and polishing equipment to provide epitaxial manufacturers with high-quality EPI-Ready substrates through processes such as CMP polishing, cleaning, and packaging. These products have extensive applications in the fields of photoelectronic devices, RF devices, and power devices.

GaAs	InP	Ge	Sapphire
2, 3, 4, 6 and 8 inch	2, 3, 4 and 6 inch	2, 4, 6 and 8 inch	2, 4, 6 and 8 inch

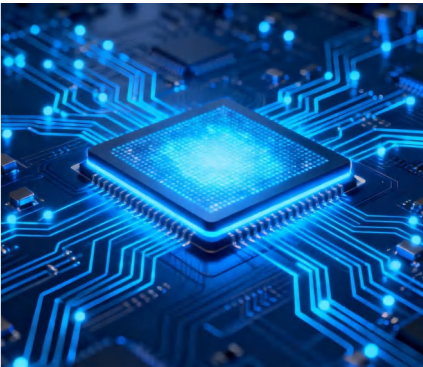
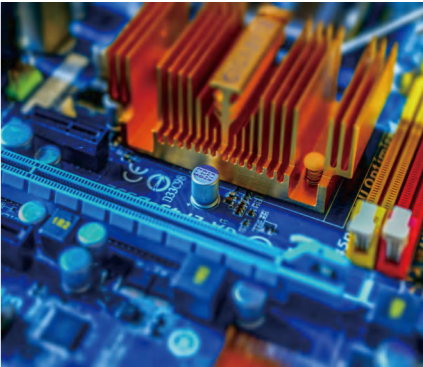
### Laser/PD Chips And Modules

VITAL offers laser light sources and detectors epitaxy, chips, and packaged modules in the 650-1550nm wavelength range. We offer end-to-end customized OEM services that cover the entire process, starting from single crystal substrates to epitaxial growth, chip fabrication, testing, and reliability characterization. Our services are tailored to meet the specific requirements of our customers, encompassing epitaxy structure, chip design, and performance specifications for various industries and applications.

660/680/76X/780/795/808/850/905/915/940/980/1060nm Laser
850/1310/1550 PD

### Semiconductor Components

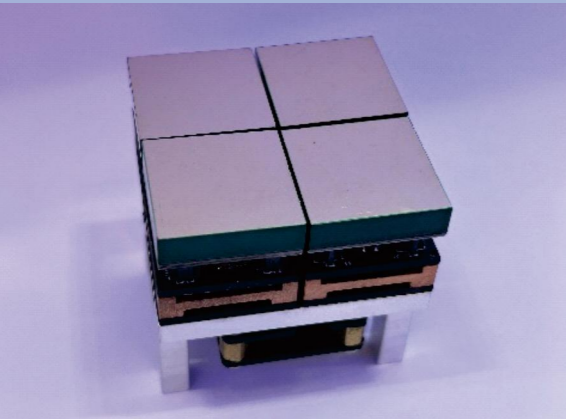
We design and manufacture key components for semiconductor equipment, including MFCs, showerheads, heaters, chambers, ESC, silicon carbide components, specialty ceramics, RF power supplies, vacuum pumps & valves, bellows, EPD-OES spectrometers, non-contact radiation pyrometers, and integrated solutions for gas delivery systems.





# MEDICAL TECHNOLOGY BUSINESS UNIT

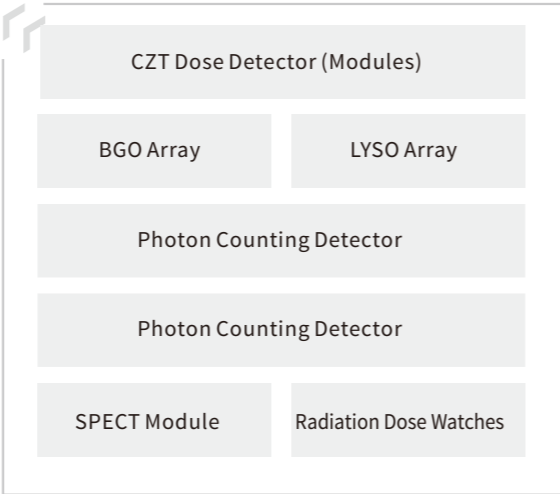
Medical Technology Business Unit is dedicated to the field of medical imaging, leveraging AI technology to create a full-industry chain from raw materials, components, system components, to medical equipment. Our products are widely used in medical imaging, clinical diagnosis, medical researchs.



## Product & Application

### Medical Imaging Components

We have complete in-house production capabilities for medical imaging components, including the growth of CZT, BGO, and LYSO crystal materials, as well as detector modules for PCCT, PET, and SPECT.

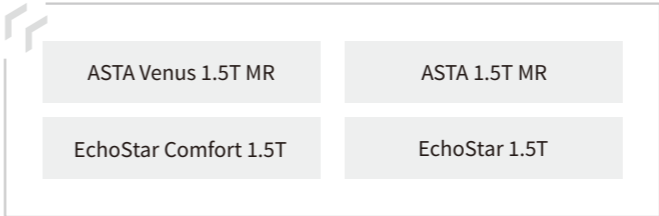


### Medical Imaging Equipment



#### • MR

In addition to conventional medical MRI, we also offer high-end customized magnets, coils, and MRI magnetic resonance imaging systems to meet your needs.



#### • DR

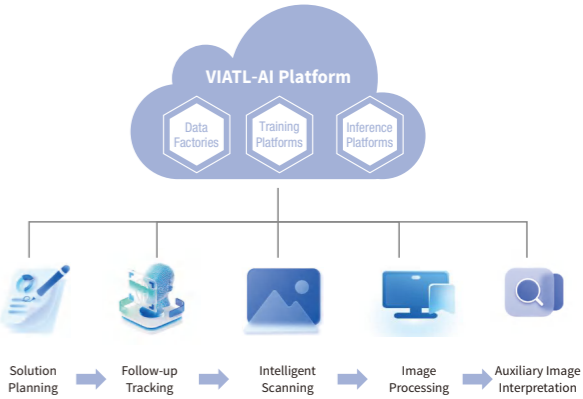
RadGlory 361

#### • US

The A8 | A8S | A8Exp series color Doppler ultrasound systems provide reliable and accurate support for clinical diagnosis.

### AI-powered Medical Imaging Intelligent Solutions

The VITAL-AI platform integrates data factories, training platforms, and inference platforms to provide powerful and easy-to-use services for the entire process, including solution planning, follow-up tracking, intelligent scanning, image processing, and auxiliary image interpretation, to help medical imaging achieve intelligent upgrades.



# MATERIALS TECHNOLOGY BUSINESS UNIT

## Products and Services

### Chemical Products

Our chemicals business is mainly engaged in high-purity rare metals (Se, Te, Bi, In, Ga, Ge, Cd, Co, precious metals, and other metals), alloys, noble metal catalysts and compound products. The special chemicals include low melting point alloys, Se/Co/Zn-containing feed additives, bismuth APIs, and environment-friendly pigments, which are widely used in agriculture (feed additives), pharmaceuticals, plastics, coatings, batteries, solder, petrochemicals and other high-tech and strategic emerging industries, and provide reduction, regeneration and recycling of catalysts.



### Recycling Service

Materials Technology Business Unit uses advanced pyrometallurgical and hydrometallurgical processes, including side-blowing furnace technology, vacuum distillation technology, and advanced processes such as solvent extraction, ion exchange, and electrolysis to recover and refine a wide variety of rare-metal-containing solids, slurries, and solutions.



We are licensed to operate hazardous waste such as selenium-containing, tellurium-containing, and non-ferrous metal smelting waste. We can assist the upstream smelting enterprises in recycling rare-metal and precious-metal containing materials. We also assist the downstream material/device enterprises in recycling a variety of rare metals and precious metals from scraps, other secondary resources, and end-of-life devices. Vital Materials recycles almost any type of rare metal containing waste.



Materials Technology Business Unit supplies rare metals, alloys, noble metal catalysts and compounds and provides closed-loop metal recovery and recycling services for global customers. Our products are widely used in pharmaceuticals, electronic components, nuclear reactors, photovoltaics, new energy batteries, metallurgy, petroleum refining, green recycling, pigments, coatings, agriculture, and other industries.

### Our Subsidiary

#### Vital Pure Metal Solutions GmbH (VPMS)

- Process and recycle a wide range of complex materials including hazardous materials
- Sales and recycling solutions to customers worldwide

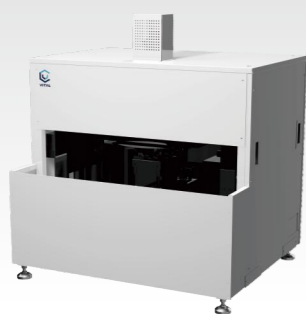
#### Jiangsu Yangzi Catalyst Co., Ltd.

- Great-performing platinum-group metals (PGMs) catalyst
- Adapting for hydrogenation, reforming, isomerization, dehydrogenation, deoxidation, denitrification, desulfurization, dearsenification and other processes
- Reduction, regeneration and recycling of non-metallic catalysts and noble metal catalysts



# SCIENTIFIC INSTRUMENTS BUSINESS UNIT

Leveraging Vital Group's three-decade expertise in fundamental materials and optoelectronics, Scientific Instruments Division specializes in providing comprehensive end-to-end solutions, encompassing R&D, manufacture, sales and service for lab analytical instrumentation, bench-top semiconductor metrology / inspection equipment, in-situ products for online applications and customizations. These solutions serve critical applications across diverse industries including scientific research, semiconductor manufacturing, food safety, biopharmaceuticals, environmental monitoring, high-end manufacturing, and so on.



## Product & Application

### Laboratory Analytic Instruments

We specialize in laboratory analytical instrumentation including mass spectrometers, spectroscopy systems, and chromatography, focusing on localization initiatives and differentiated market positioning through systems and critical components/modules, which provide precise quantitative and qualitative analysis for semiconductor industries, academic research institutions, governmental and third-party testing laboratories to improve our customers' productivity and efficiency.

### Metrology Instruments

Our bench-top metrology systems, including ellipsometers, wafer curvature analyzers, enable in-line measurement of critical 6-12" wafer parameters - film thickness, refractive index, and warpage - empowering semiconductor fabs to rapidly detect process deviations, refine manufacturing workflows, and optimize yield performance.

### Radiation Pyrometer

Our high precision radiation pyrometers deliver advanced thermal measurement and thermal field analysis, serving both semiconductor manufacturing (crystal growth, ion implantation, CVD EPI, RTP, etc.) and traditional industrial thermal process control including steel manufacturing, petrochemical refining, hazardous waste treatment, and glass production.



### MOCVD In-Situ Monitoring System

MOCVD Equipment enables real-time process control of growth parameters and reactor conditions during epitaxial deposition, optimizing layer uniformity while minimizing process deviations and scrap rates. Graphite susceptors heating and reaction chambers temperature monitoring products are also provided.



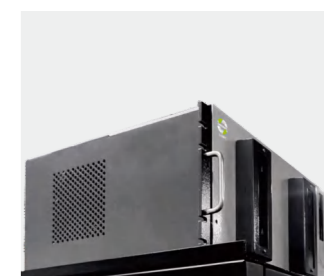
### Semiconductor Process Endpoint Detection System

Semiconductor process endpoint detection systems that utilize emission spectroscopy information to perform in-situ real-time monitoring and control of various plasma process characteristics and equipment status. It can be applied in dry etching, ALD, PECVD, PVD, ion stripping processes and so on, widely used in chip/display/solar cell industry.



### Vacuum Chamber Leakage Real-Time Detection System

We provide real-time leakage risk inspection and detection systems for vacuum process chambers. By leveraging emission spectroscopy information and AI algorithm models, the system enables online, real-time identification of leakage risks in vacuum chambers during production. Leakage rate detection limit could reach  $1 \times 10^{-8} \text{ Pa} \cdot \text{m}^3/\text{s}$ .



### Vacuum Composition Gas Analyzer

Vacuum composition gas analyzer is a more sensitive online monitoring system. It could be used in gas composition analysis and leak detection in various vacuum chambers including CVD, PVD, and MOCVD equipments.





# R&D CAPABILITIES

## HIGH PURITY TECHNOLOGIES

- High purity metal purification
- High purity electronic gas purification
- High purity reagent purification
- High purity compound synthesis

## CRYSTAL TECHNOLOGIES

- High purity polycrystalline material synthesis
- Crystal growth
- Crystal processing
- Crystal application research
- Crystal growth equipment design

## TARGET MATERIAL TECHNOLOGIES

- Powder synthesis
- Ultrafine powder processing and granulation
- Target molding
- Target sintering
- Metal target casting and heat treatment
- Target bonding and testing

## NANOTECHNOLOGIES

- Nano-material synthesis
- Dispersion and morphology control
- Surface treatment
- Application research

## CHIP TECHNOLOGIES

- Epitaxial growth technology
- Chip processing technology

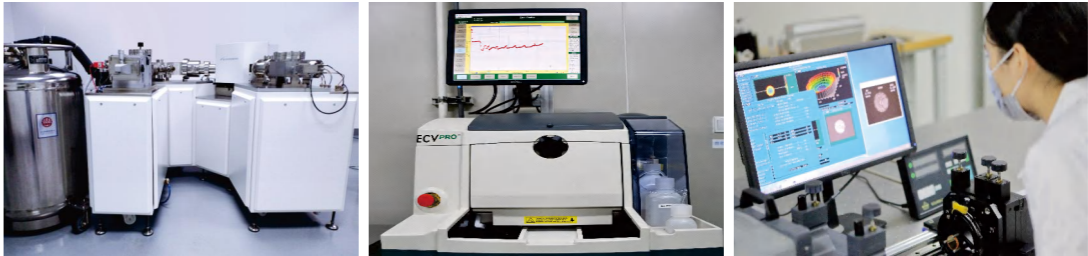
## OPTICAL TECHNOLOGIES

- CNC technology
- Optical coating technology
- Low noise, high frequency, and large area array readout circuit design
- High-yield, large TCR, and low-stress MEMS structure design and processing

Vital Materials pursues continuous improvement of its technology and develops new material solutions and products. We take great pride in our resources.



Vital Technology Group Central Research Institute, focusing on research and development in high-end materials, equipment manufacturing, microelectronics, optoelectronics, and renewable energy, contributes to VITAL group's high-quality productivity and development in optoelectronics, photovoltaics, healthcare, chemicals, advanced materials, new energy, and semiconductors.



# GLOBAL PRESENCE



Advanced Materials Plant  
(Qingyuan Industrial Park)



CS Microelectronics Co., Ltd.  
(Gaofeng Park)



AllTech Medical Systems, LLC.



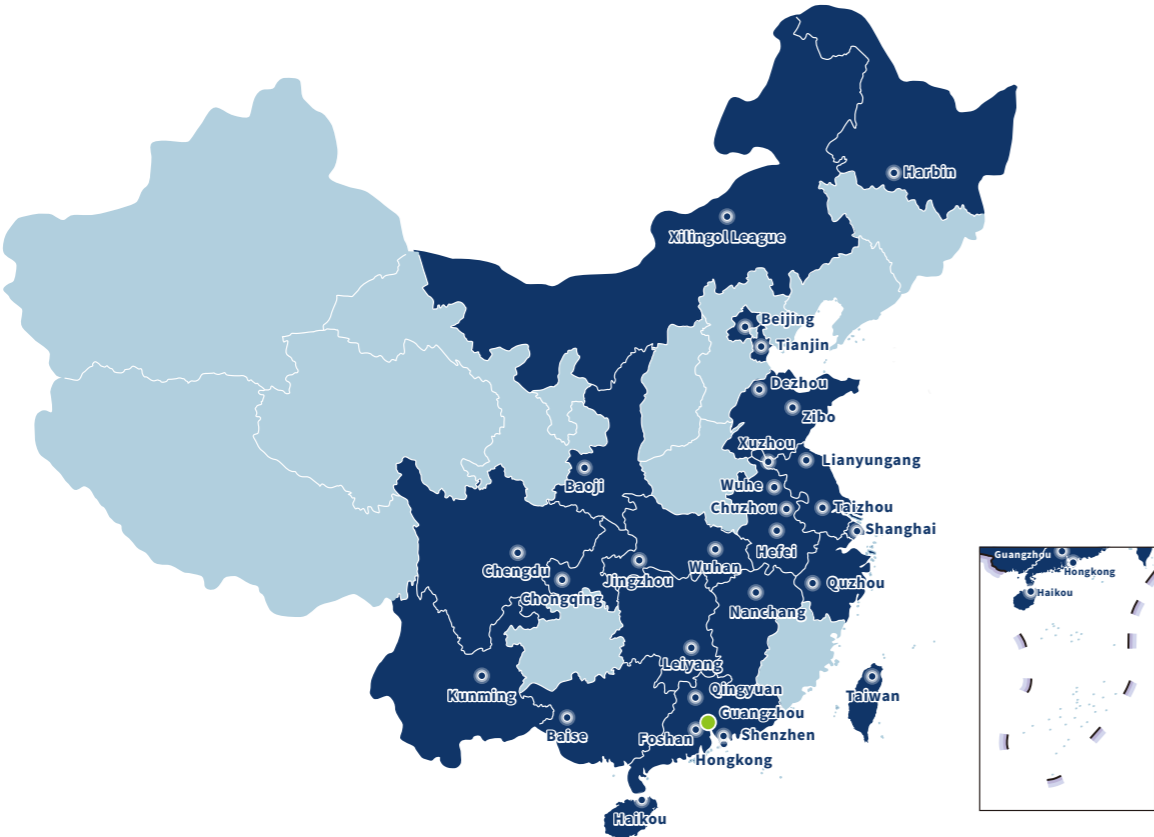
KV Materials Co., Ltd.



FHR Anlagenbau GmbH



Vital Chemicals USA, LLC.



## Head Office

### Vital Materials Co., Limited

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## Industrial Bases

Advanced Materials Production Plant  
(Qingyuan, Guangdong / Jingzhou, Hubei)

Vital Thin Film Materials Production Plant (Qingyuan,  
Guangdong / Hefei, Anhui / Zibo, Shandong / Xuzhou,  
Jiangsu / Kunming, Yunnan / Quzhou, Zhejiang)

Infrared Optical Plant (Harbin, Heilongjiang / Chuzhou, Anhui)

High-end equipment manufacturing Plant (Xuzhou, Jiangsu  
/ Lianyungang, Jiangsu / Guangzhou, Guangdong / Dezhou,  
Shandong)

Pigments Plant (Tianjin)

Functional Materials & Recycling Bases  
(Linyang, Hunan / Qingyuan, Guangdong)

## Group Notification

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## Overseas Offices and Subsidiaries

US Subsidiary  
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